

Claims:

1. Apparatus for igniting a fuel/air mixture in a combustion chamber of a combustion engine with at least one light source, an optical transmission
5 apparatus and a coupling optic for focusing light into said combustion chamber, characterized in that at least one master light source is provided for the constant emission of untriggered, themselves non-flammable master light pulses and that said transmission apparatus includes at least one amplifier which is selectively triggerable and amplifies individual or groups of master
10 light pulses to an energy level which is sufficient to ignite said fuel/air mixture.
2. Apparatus according to claim 1, characterized in that said master light source is provided for the constant periodic emission of untriggered, themselves non-
15 flammable master light pulses.
3. Apparatus according to claim 1, characterized in that said combustion engine is a stationary gas engine.
- 20 4. Apparatus according to claim 1, characterized in that said master light source is a laser.
5. Apparatus according to claim 4, characterized in that said laser is a solid-state laser.
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6. Apparatus according to claim 5, characterized in that said solid-state laser is diode-pumped or passively Q-switched or actively Q-switched.
7. Apparatus according to claim 5, characterized in that said solid-state laser is a
30 Yb laser or Nd laser.
8. Apparatus according to claim 7, characterized in that said Nd-laser is an Nd laser with Cr^{4+} saturable absorber.

9. Apparatus according to claim 1, characterized in that said master light source emits light pulses or laser pulses with a repetition frequency of 1 to 25 kHz.
- 5 10. Apparatus according to claim 9, characterized in that said repetition frequency is 5 kHz.
11. Apparatus according to claim 1, characterized in that said master light source emits light pulses or laser pulses with a pulse duration of 1 ns to 500 ns.
- 10 12. Apparatus according to claim 1, characterized in that said master light source emits light pulses or laser pulses with a pulse duration of 100 ns to 300 ns.
13. Apparatus according to claim 1, characterized in that the wavelength of said light used is between 0.5 μm and 20 μm .
- 15 14. Apparatus according to claim 1, characterized in that the wavelength of said light used is between 0.5 μm and 5 μm .
15. Apparatus according to claim 1, characterized in that at least one amplifier of said transmission apparatus includes at least one light-amplifying light guide or at least one monolithic rod or at least one light-amplifying crystal wafer.
- 20 16. Apparatus according to claim 15, characterized in that said light guide or said monolithic rod or said crystal wafer is laser active.
- 25 17. Apparatus according to claim 15 characterized in that said light guide is a flexible optical fibre.
18. Apparatus according to claim 15, characterized in that said amplifier amplifies the energy level of said light or laser pulses to 0.5 mJ to 10 mJ.
- 30 19. Apparatus according to claim 15, characterized in that said amplifier amplifies the energy level of said light or laser pulses to 1 mJ to 5 mJ.

20. Apparatus according to claim 15, characterized in that, in the case of a light-amplifying or laser-active optical fibre, this has a section that is wound up.
- 5 21. Apparatus according to claim 20, characterized in that said optical fibre has a section wound up in a coil shape.
- 10 22. Apparatus according to claim 15, characterized in that at least one triggerable pump light source acting on at least one light-amplifying light guide or at least one light-amplifying monolithic rod or at least one light-amplifying crystal wafer is provided.
23. Apparatus according to claim 22, characterized in that said light guide or said monolithic rod or said crystal wafer is laser active.
- 15 24. Apparatus according to claim 1, characterized in that said pump light source is a semiconductor laser.
- 20 25. Apparatus for a multi-cylinder combustion engine according to claim 1, characterized in that for several cylinders, only one common master light source is provided in each case and said optical transmission apparatus has one or more branches in order to distribute said master light to cylinder-selective, triggerable amplifiers.